



## **WATER RESOURCES RESEARCH GRANT PROPOSAL**

---

Title: Development and Monitoring of Best Agricultural Management Practices to Minimize Nitrate Pollution in a Shallow, Calcareous Soil, Continuing Project

Duration: September 1, 1996 to August 31, 1997

Fiscal Year 1996 Federal Funds: \$42,713

Non-Federal Funds Allocated: N/A

Principal Investigators:

Peter Motavalli, Assistant Professor of Soil Science, College of Agriculture and Life Sciences, University of Guam, Mangilao, GU 96923

James McConnell, Associate Professor of Horticulture, College of Agriculture and Life Sciences, University of Guam, Mangilao, GU 96923

Prem Singh, Assistant Professor of Agricultural Engineering, College of Agriculture and Life Sciences, University of Guam, Mangilao, GU 96923

Statement of the Critical Regional Water Problems:

Although agricultural land use on Guam only accounts for 1 to 3 % of the total land use of the island, current agricultural practices on Guam have a high potential for non-point source pollution of groundwater. This potential is a result of widespread use of inorganic and organic fertilizers and high annual precipitation. In addition, the naturally shallow and well-drained soil cover located primarily in Northern Guam and in other islands in Micronesia increases the rate at which nitrates can enter groundwater. However, relatively little information is available on the impact of agricultural practices, such as rates of nitrogen fertilizer and irrigation, on groundwater pollution under Guam's environmental conditions. In addition, methods to monitor nitrate leaching have not been compared on Guam. In light of the rapid development of new golf courses on Guam and in the region, this information is needed in order to develop nitrogen fertilizer recommendations for growers and to assist in development of regulations based on local environmental conditions.

The first year of this project has provided baseline information on the effects of soil physical properties, nitrogen source and plant growth on nitrate movement. Additional research which will be addressed in the second year of the project will determine rates and amounts of nitrate movement as influenced by agricultural management of nitrogen fertilizer rates and levels of irrigation in the field under natural environmental conditions. In addition, methods to monitor nitrate leaching will be compared in order to provide

recommendations on the potential use of these methods under the environmental conditions encountered on Guam and in the region of Micronesia.

**Statement of the Results and Benefits of the Information Expected:**

An objective of the Guam Non-Point Source Management Program is to identify best management practices (BMPs) and measures to reduce pollutant loading. By assessing the impact of several agricultural practices on nitrate pollution, this project will indicate best agricultural management practices for environmental conditions in Northern Guam. A field site will be established on a soil type, the Guam cobbly clay loam, which covers approximately 24 % of the total land area on Guam, thereby insuring that results will have applicability to a large geographic area. In addition, other islands in Micronesia have similar calcareous soils derived from limestone parent material. Results of these projects can form the basis of regulations or recommendations instituted by the Guam Environmental Protection Agency in its Non-Point Source Management Program. In addition, these results can be incorporated into current plant nutrient and management recommendations provided to growers by the Soil and Plant Testing Program and Agricultural and Natural Resource Extension Program of the University of Guam. The information generated by this project can also be used in the adaptation and validation of soil nitrate leaching computer simulation models. These models could be beneficial for management of agricultural activities on areas overlying the limestone aquifer.